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<110> Slater, Michael
Huang, Fen
Hartnett, James

<120> Mutant TNE Polymerases

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<141> 2000-08-18

<150> 09/385,986

<151> 1999-08-30

<150> 08/484,661

<151> 1995-06-07

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<170> PatentIn version 3.0

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His Ile Ile Pro Glu Lys Asp Tyr Ala Ala Val Ala Phe Asp Lys Lys
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Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln Val
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His Asp Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu Leu
850 855 860

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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys	
20 25 30	
Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro	
35 40 45	
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr	
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Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu	
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Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser	
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Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val	
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Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala	
115 120 125	

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
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Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
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Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
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Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

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595 600 605

Trp Ser
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Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr		
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Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu		
35 40 45		
aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg		192
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser		
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Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val		
65 70 75 80		

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aat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser 100 105 110	336
ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser 115 120 125	384
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aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu 145 150 155 160	480
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 165 170 175	528
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 180 185 190	576
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cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 275 280 285	864
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ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 325 330 335	1008
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gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 385 390 395 400	1200
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 405 410 415	1248
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ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 435 440 445	1344
cca aag gtg cga agc tac atc cag cag gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 450 455 460	1392
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 465 470 475 480	1440
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ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 500 505 510	1536
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gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 545 550 555 560	1680

gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1728
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Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu	
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Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser	
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	60
Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val	
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Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala	
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Tyr Leu Leu Glu Pro Asn Glu Lys Phe Asn Leu Glu Asp Leu Ser	
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Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser	
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Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp	
130	135
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Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu	
145	150
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Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
165 170 175

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
180 185 190

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
195 200 205

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
210 215 220

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
225 230 235 240

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
245 250 255

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
260 265 270

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
275 280 285

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
290 295 300

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
305 310 315 320

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
325 330 335

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
340 345 350

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
355 360 365

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
370 375 380

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
385 390 395 400

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
405 410 415

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
420 425 430

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
435 440 445

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
450 455 460

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
465 470 475 480

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
485 490 495

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
500 505 510

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
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Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
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 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
 20 25 30

 gag gtt cca tct ttt gcc ctg gaa ctt gaa acg tcc tcc ctt gac ccg
 Glu Val Pro Ser Phe Ala Leu Glu Leu Glu Thr Ser Ser Leu Asp Pro
 35 40 45

 ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca
 Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
 50 55 60

 gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa
 Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
 65 70 75 80

 aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
 85 90 95

 aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta
 Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
 100 105 110

 aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca
 Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
 115 120 125

 tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct
 Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
 130 135 140

 ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg
 Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
 145 150 155 160

 ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac
 Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
 165 170 175

 aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc
 Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
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 tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc
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 195 200 205

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 Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
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ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
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Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu	
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Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln	
500 505 510	
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca	1584
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515 520 525	
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct	1632
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Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg	
545 550 555 560	
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Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu	
565 570 575	
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Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val	
580 585 590	
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1824
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Glu Val Pro Ser Phe Ala Leu Glu Leu Glu Thr Ser Ser Leu Asp Pro	
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Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val
580 585 590

Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser
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Trp Ser
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48

atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys 20 25 30	96
gag gtt cca tct ttt gcc ctg gac ctt gac acg tcc tcc ctt gac ccg Glu Val Pro Ser Phe Ala Leu Asp Leu Asp Thr Ser Ser Leu Asp Pro 35 40 45	144
ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr 50 55 60	192
gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu 65 70 75 80	240
aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser 85 90 95	288
aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val 100 105 110	336
aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala 115 120 125	384
tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser 130 135 140	432
ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser 145 150 155 160	480
ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp 165 170 175	528
aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu 180 185 190	576
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 195 200 205	624
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768

gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa qag ata qcg aat qag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488

aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag	1536		
Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln			
500	505	510	
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca	1584		
Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala			
515	520	525	
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct	1632		
Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala			
530	535	540	
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga	1680		
Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg			
545	550	555	560
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag	1728		
Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu			
565	570	575	
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg	1776		
Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val			
580	585	590	
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1824		
Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser			
595	600	605	
tgg tct tga	1833		
Trp Ser			
610			
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys			
20	25	30	
Glu Val Pro Ser Phe Ala Leu Asp Leu Asp Thr Ser Ser Leu Asp Pro			
35	40	45	
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr			
50	55	60	

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val
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Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser
595 600 605

Trp Ser
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39

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1           5           10           15

atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag      96
Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
20          25          30

gag gtt cca tct ttt gcc ctg gac ctt gaa acg tcc tcc ctt gac ccg      144
Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro
35          40          45

ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca      192
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50          55          60

gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa      240
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65          70          75          80

aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg      288
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85          90          95

aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta      336
Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
100         105         110

aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca      384
Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115         120         125

tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct      432
Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
130         135         140

ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg      480
Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145         150         155         160

ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac      528
Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165         170         175

aag gct gcg aac ttc tcc tgc gag gat gca gat atc act tat agg ctc      576
Lys Ala Ala Asn Phe Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
180         185         190

tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc      624
Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195         200         205

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ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344

ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 580 585 590	1776
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser 595 600 605	1824
tgg tct tga Trp Ser 610	1833
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Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Phe Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val
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Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser
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Trp Ser
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32

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 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
 20 25 30

 gag gtt cca tct ttt gcc ctg gac ctt gaa acg tcc tcc ctt gac ccg 144
 Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro
 35 40 45

 ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca 192
 Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
 50 55 60

 gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa 240
 Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
 65 70 75 80

 aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg 288
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
 85 90 95

 aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta 336
 Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
 100 105 110

 aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca 384
 Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
 115 120 125

 tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct 432
 Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
 130 135 140

 ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg 480
 Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
 145 150 155 160

 ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac 528
 Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
 165 170 175

 aag gct gcg aac tac tcc tgc gag aat gct gac atc act tat agg ctc 576
 Lys Ala Ala Asn Tyr Ser Cys Glu Asn Ala Asp Ile Thr Tyr Arg Leu
 180 185 190

 tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc 624
 Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
 195 200 205

ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344

ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata	1392
Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile	
450 455 460	
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat	1440
Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr	
465 470 475 480	
cca aag gtg cga agc tac atc cag cag gtt gca gag gca aaa gag	1488
Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu	
485 490 495	
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag	1536
Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln	
500 505 510	
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca	1584
Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala	
515 520 525	
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct	1632
Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala	
530 535 540	
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga	1680
Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg	
545 550 555 560	
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag	1728
Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu	
565 570 575	
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg	1776
Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val	
580 585 590	
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1824
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595 600 605	
tgg tct tga	1833
Trp Ser	
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35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Phe Asn Leu Glu Asp Leu Ser
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asn Ala Asp Ile Thr Tyr Arg Leu
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val
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Trp Ser
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 atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag 96
 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
 20 25 30

 gag gtt cca tct ttt gcc ctg gcc ctt gaa acg tcc tcc ctt gac ccg 144
 Glu Val Pro Ser Phe Ala Leu Ala Leu Glu Thr Ser Ser Leu Asp Pro
 35 40 45

 ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca 192
 Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
 50 55 60

 gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa 240
 Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
 65 70 75 80

 aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg 288
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
 85 90 95

 aag att gtg ggt cag aac ctg aag tac gac tac aag gtt ctt atg gta 336
 Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
 100 105 110

 aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca 384
 Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
 115 120 125

 tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct 432
 Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
 130 135 140

 ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg 480
 Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
 145 150 155 160

 ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac 528
 Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
 165 170 175

 aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc 576
 Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
 180 185 190

 tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc 624
 Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
 195 200 205

ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152
tgg atc gtc agt gcg gat tat tcc caa ata gaa ctc aga atc ctc gct Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala 385 390 395 400	1200
cat ctc agt ggt gat gag aac ctt gtg aag gcc ttc gag gag ggc atc His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile 405 410 415	1248
gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344

ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 580 585 590	1776
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser 595 600 605	1824
tgg tct tga Trp Ser 610	1833
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Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
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Glu Val Pro Ser Phe Ala Leu Ala Leu Glu Thr Ser Ser Leu Asp Pro
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Asp Tyr Lys Val Leu Met Val
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Phe Asn Leu Glu Asp Leu Ser
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val
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Trp Ser
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atc gtg aag gat cat aag acc ttc gaa gat ctc atc gaa aag ctg aag	96
Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys	
20 25 30	
gag gtt cca tct ttt gcc ctg gac ctt gaa acg tcc tcc ctt gac ccg	144
Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro	
35 40 45	
ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca	192
Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr	
50 55 60	
gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa	240
Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu	
65 70 75 80	
aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg	288
Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser	
85 90 95	
aag att gtg ggt cag aac ctg aag tac gcg tac aag gtt ctt atg gta	336
Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val	
100 105 110	
aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca	384
Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala	
115 120 125	
tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct	432
Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser	
130 135 140	

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aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu 180 185 190	576
tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val 195 200 205	624
ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu 210 215 220	672
ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
gga aga att cat gca tct ttc cac cag acg ggt acc gcc act ggc agg Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg 340 345 350	1056
ttg agt agc agt gat cca aat ctt cag aat ctt ccg aca aag agc gaa Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu 355 360 365	1104
gag gga aaa gaa att aga aaa gcg att gtg ccc cag gat cca gac tgg Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp 370 375 380	1152

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gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cggtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392
ccg gtt aaa gaa gca gaa aag atg att atc agc tat ttc aca ctg tat Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr 465 470 475 480	1440
cca aag gtg cga agc tac atc cag cag gtt gca gag gca aaa gag Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu 485 490 495	1488
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln 500 505 510	1536
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala 515 520 525	1584
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala 530 535 540	1632
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg 545 550 555 560	1680
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu 565 570 575	1728
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val 580 585 590	1776
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc Val Lys Leu Ser Val Pro Leu Glu Val Asp Ile Ser Ile Gly Lys Ser 595 600 605	1824
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Glu Val Pro Ser Phe Ala Leu Asp Leu Glu Thr Ser Ser Leu Asp Pro
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

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Trp Ser
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 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ile Glu Lys Leu Lys
 20 25 30
 gag gtt cca tct ttt gcc ctg gcc ctt gaa acg tcc tcc ctt gac ccg 144
 Glu Val Pro Ser Phe Ala Leu Ala Leu Glu Thr Ser Ser Leu Asp Pro
 35 40 45
 ttc aac tgt gag ata gtc ggc atc tcc gtg tcg ttc aaa ccg aaa aca 192
 Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
 50 55 60
 gct tat tac att cca ctt cat cac aga aac gcc cag aat ctt gat gaa 240
 Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
 65 70 75 80
 aca ctg gtg ctg tcg aag ttg aaa gag atc ctc gaa gac ccg tct tcg 288
 Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
 85 90 95
 aag att gtg ggt cag aac ctg aag tac gcg tac aag gtt ctt atg gta 336
 Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val
 100 105 110
 aag ggt ata tcg cca gtt tat ccg cat ttt gac acg atg ata gct gca 384
 Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
 115 120 125
 tat ttg ctg gag cca aac gag aaa aaa ttc aat ctc gaa gat ctg tct 432
 Tyr Leu Leu Glu Pro Asn Glu Lys Lys Phe Asn Leu Glu Asp Leu Ser
 130 135 140
 ttg aaa ttt ctc gga tac aaa atg acg tct tat cag gaa ctg atg tcg 480
 Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
 145 150 155 160
 ttt tcc tca cca ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac 528
 Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
 165 170 175
 aag gct gcg aac tac tcc tgc gag gat gca gac atc act tat agg ctc 576
 Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
 180 185 190
 tac aag ata ctc agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc 624
 Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
 195 200 205
 ttc tac agg ata gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa 672
 Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
 210 215 220

ttg aac ggg gtg tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu 225 230 235 240	720
gag tac ggc aaa aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile 245 250 255	768
gca gga gag ccc ttc aac atc aat tct cca aaa cag gtt tca aag atc Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile 260 265 270	816
ctt ttt gag aag ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr 275 280 285	864
gga gcg tac tct acc agg ata gag gtg ttg gaa gag ata gcg aat gag Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Ile Ala Asn Glu 290 295 300	912
cac gag ata gta ccc ctc att ctc gag tac aga aag atc cag aaa ctg His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu 305 310 315 320	960
aaa tcg acc tac ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr 325 330 335	1008
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gat gtg cac acc ttg act gcc tcc agg atc tac aac gta aag cca gaa Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu 420 425 430	1296
gaa gtg aac gaa gaa atg cga cgg gtt gga aag atg gtg aac ttc tct Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser 435 440 445	1344
ata ata tac ggt gtc aca ccg tac ggt ctt tct gtg aga ctt gga ata Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile 450 455 460	1392

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Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr	
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Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu	
485 490 495	
aag ggc tac gtc agg act ctc ttt gga aga aaa aga gat att ccc cag	1536
Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln	
500 505 510	
ctc atg gca agg gac aag aac acc cag tcc gaa ggc gaa aga atc gca	1584
Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala	
515 520 525	
ata aac acc ccc att cag gga acg gcg gca gat ata ata aaa ttg gct	1632
Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala	
530 535 540	
atg ata gat ata gac gag gag ctg aga aaa aga aac atg aaa tcc aga	1680
Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg	
545 550 555 560	
atg atc att cag gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag	1728
Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu	
565 570 575	
gaa aaa gaa gaa cta gtt gat ctg gtg aag aac aaa atg aca aat gtg	1776
Glu Lys Glu Glu Leu Val Asp Leu Val Lys Asn Lys Met Thr Asn Val	
580 585 590	
gtg aaa ctc tct gtg cct ctt gag gtt gac ata agc atc gga aaa agc	1824
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Glu Val Pro Ser Phe Ala Leu Ala Leu Glu Thr Ser Ser Leu Asp Pro
35 40 45

Phe Asn Cys Glu Ile Val Gly Ile Ser Val Ser Phe Lys Pro Lys Thr
50 55 60

Ala Tyr Tyr Ile Pro Leu His His Arg Asn Ala Gln Asn Leu Asp Glu
65 70 75 80

Thr Leu Val Leu Ser Lys Leu Lys Glu Ile Leu Glu Asp Pro Ser Ser
85 90 95

Lys Ile Val Gly Gln Asn Leu Lys Tyr Ala Tyr Lys Val Leu Met Val
100 105 110

Lys Gly Ile Ser Pro Val Tyr Pro His Phe Asp Thr Met Ile Ala Ala
115 120 125

Tyr Leu Leu Glu Pro Asn Glu Lys Phe Asn Leu Glu Asp Leu Ser
130 135 140

Leu Lys Phe Leu Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser
145 150 155 160

Phe Ser Ser Pro Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp
165 170 175

Lys Ala Ala Asn Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu
180 185 190

Tyr Lys Ile Leu Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val
195 200 205

Phe Tyr Arg Ile Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu
210 215 220

Leu Asn Gly Val Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu
225 230 235 240

Glu Tyr Gly Lys Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile
245 250 255

Ala Gly Glu Pro Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile
260 265 270

Leu Phe Glu Lys Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr
275 280 285

Gly Ala Tyr Ser Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu
290 295 300

His Glu Ile Val Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu
305 310 315 320

Lys Ser Thr Tyr Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr
325 330 335

Gly Arg Ile His Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg
340 345 350

Leu Ser Ser Ser Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu
355 360 365

Glu Gly Lys Glu Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp
370 375 380

Trp Ile Val Ser Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala
385 390 395 400

His Leu Ser Gly Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile
405 410 415

Asp Val His Thr Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu
420 425 430

Glu Val Asn Glu Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser
435 440 445

Ile Ile Tyr Gly Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile
450 455 460

Pro Val Lys Glu Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr
465 470 475 480

Pro Lys Val Arg Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu
485 490 495

Lys Gly Tyr Val Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln
500 505 510

Leu Met Ala Arg Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala
515 520 525

Ile Asn Thr Pro Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala
530 535 540

Met Ile Asp Ile Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg
545 550 555 560

Met Ile Ile Gln Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu
565 570 575

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Ile Ser Val Ser Phe Lys Pro Lys Thr Ala Tyr Tyr Ile Pro Leu His
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cac aga aac gcc cag aat ctt gat gaa aca ctg gtg ctg tcg aag ttg 144
His Arg Asn Ala Gln Asn Leu Asp Glu Thr Leu Val Leu Ser Lys Leu
35 40 45

aaa gag atc ctc gaa gac ccg tct tcg aag att gtg ggt cag aac ctg 192
Lys Glu Ile Leu Glu Asp Pro Ser Ser Lys Ile Val Gly Gln Asn Leu
50 55 60

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ccg cat ttt gac acg atg ata gct gca tat ttg ctg gag cca aac gag Pro His Phe Asp Thr Met Ile Ala Ala Tyr Leu Leu Glu Pro Asn Glu 85 90 95	288
aaa aaa ttc aat ctc gaa gat ctg tct ttg aaa ttt ctc gga tac aaa Lys Lys Phe Asn Leu Glu Asp Leu Ser Leu Lys Phe Leu Gly Tyr Lys 100 105 110	336
atg acg tct tat cag gaa ctg atg tcg ttt tcc tca cca ctt ttt ggt Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro Leu Phe Gly 115 120 125	384
ttc agc ttt gcg gat gtt ccg gta gac aag gct gcg aac tac tcc tgc Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn Tyr Ser Cys 130 135 140	432
gag gat gca gac atc act tat agg ctc tac aag ata ctc agc atg aag Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu Ser Met Lys 145 150 155 160	480
ctc cat gaa gcg gaa ctt gag aac gtc ttc tac agg ata gag atg ccg Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile Glu Met Pro 165 170 175	528
ctt gtg aac gtt ctt gca cgc atg gaa ttg aac ggg gtg tat gtg gac Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr Val Asp 180 185 190	576
aca gaa ttc ctg aaa aag ctc tcg gag gag tac ggc aaa aag ctc gag Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys Leu Glu 195 200 205	624
gaa ctg gcc gaa aaa atc tac cag ata gca gga gag ccc ttc aac atc Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro Phe Asn Ile 210 215 220	672
aat tct cca aaa cag gtt tca aag atc ctt ttt gag aag ctg gga ata Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys Leu Gly Ile 225 230 235 240	720
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gag gtg ttg gaa gag ata gcg aat gag cac gag ata gta ccc ctc att Glu Val Leu Glu Ile Ala Asn Glu His Glu Ile Val Pro Leu Ile 260 265 270	816
ctc gag tac aga aag atc cag aaa ctg aaa tcg acc tac ata gac acc Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile Asp Thr 275 280 285	864
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305 310 315 320	
cct cag aat ctt ccg aca aag agc gaa gag gga aaa gaa att aga aaa	1008
Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile Arg Lys	
325 330 335	
gcg att gtg ccc cag gat cca gac tgg tgg atc gtc agt gcg gat tat	1056
Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser Ala Asp Tyr	
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Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp Glu Asn	
355 360 365	
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Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu Thr Ala	
370 375 380	
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Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu Glu Met Arg	
385 390 395 400	
cg ^g gtt gga aag atg gtg aac ttc tct ata ata tac ggt gtc aca ccg	1248
Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly Val Thr Pro	
405 410 415	
tac ggt ctt tct gtg aga ctt gga ata ccg gtt aaa gaa gca gaa aag	1296
Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu Ala Glu Lys	
420 425 430	
atg att atc agc tat ttc aca ctg tat cca aag gtg cga agc tac atc	1344
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435 440 445	
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Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val Arg Thr Leu	
450 455 460	
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465 470 475 480	
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Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile Gln Gly	
485 490 495	
acg gcg gca gat ata ata aaa ttg gct atg ata gat ata gac gag gag	1536
Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile Asp Glu Glu	
500 505 510	
ctg aga aaa aga aac atg aaa tcc aga atg atc att cag gtt cat gac	1584
Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln Val His Asp	
515 520 525	
gaa ctg gtc ttc gag gtt ccc gat gag gaa aaa gaa gaa cta gtt gat	1632
Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu Leu Val Asp	
530 535 540	

ctg	gtg	aag	aac	aaa	atg	aca	aat	gtg	gtg	aaa	ctc	tct	gtg	cct	ctt	1680
Leu	Val	Lys	Asn	Lys	Met	Thr	Asn	Val	Val	Lys	Leu	Ser	Val	Pro	Leu	
545					550					555					560	
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Ile Ser Val Ser Phe Lys Pro Lys Thr Ala Tyr Tyr Ile Pro Leu His																
	20		25			30										
His Arg Asn Ala Gln Asn Leu Asp Glu Thr Leu Val Leu Ser Lys Leu																
	35		40		45											
Lys Glu Ile Leu Glu Asp Pro Ser Ser Lys Ile Val Gly Gln Asn Leu																
	50		55		60											
Lys Tyr Asp Tyr Lys Val Leu Met Val Lys Gly Ile Ser Pro Val Tyr																
	65		70		75		80									
Pro His Phe Asp Thr Met Ile Ala Ala Tyr Leu Leu Glu Pro Asn Glu																
	85		90		95											
Lys Lys Phe Asn Leu Glu Asp Leu Ser Leu Lys Phe Leu Gly Tyr Lys																
	100		105		110											
Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro Leu Phe Gly																
	115		120		125											
Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn Tyr Ser Cys																
	130		135		140											
Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu Ser Met Lys																
	145		150		155		160									

Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile Glu Met Pro
165 170 175

Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val Tyr Val Asp
180 185 190

Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys Lys Leu Glu
195 200 205

Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro Phe Asn Ile
210 215 220

Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys Leu Gly Ile
225 230 235 240

Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser Thr Arg Ile
245 250 255

Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val Pro Leu Ile
260 265 270

Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr Ile Asp Thr
275 280 285

Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His Ala Ser Phe
290 295 300

His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser Asp Pro Asn
305 310 315 320

Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu Ile Arg Lys
325 330 335

Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser Ala Asp Tyr
340 345 350

Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly Asp Glu Asn
355 360 365

Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr Leu Thr Ala
370 375 380

Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu Glu Met Arg
385 390 395 400

Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly Val Thr Pro
405 410 415

Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu Ala Glu Lys
420 425 430

Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg Ser Tyr Ile
435 440 445

Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val Arg Thr Leu
450 455 460

Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg Asp Lys Asn
465 470 475 480

Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro Ile Gln Gly
485 490 495

Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile Asp Glu Glu
500 505 510

Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln Val His Asp
515 520 525

Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu Leu Val Asp
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 Ile Val Lys Asp His Lys Thr Phe Glu Asp Leu Ser Leu Lys Phe Leu
 20 25 30

 gga tac aaa atg acg tct tat cag gaa ctg atg tcg ttt tcc tca cca 144
 Gly Tyr Lys Met Thr Ser Tyr Gln Glu Leu Met Ser Phe Ser Ser Pro
 35 40 45

 ctt ttt ggt ttc agc ttt gcg gat gtt ccg gta gac aag gct gcg aac 192
 Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn
 50 55 60

 tac tcc tgc gag gat gca gac atc act tat agg ctc tac aag ata ctc 240
 Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu
 65 70 75 80

 agc atg aag ctc cat gaa gcg gaa ctt gag aac gtc ttc tac agg ata 288
 Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile
 85 90 95

 gag atg ccg ctt gtg aac gtt ctt gca cgc atg gaa ttg aac ggg gtg 336
 Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val
 100 105 110

 tat gtg gac aca gaa ttc ctg aaa aag ctc tcg gag gag tac ggc aaa 384
 Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys
 115 120 125

 aag ctc gag gaa ctg gcc gaa aaa atc tac cag ata gca gga gag ccc 432
 Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro
 130 135 140

 ttc aac atc aat tct cca aaa cag gtt tca aag atc ctt ttt gag aag 480
 Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys
 145 150 155 160

 ctg gga ata aaa ccc cgt gga aaa acg aca aaa aca gga gcg tac tct 528
 Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser
 165 170 175

 acc agg ata gag gtg ttg gaa gag ata gcg aat gag cac gag ata gta 576
 Thr Arg Ile Glu Val Leu Glu Ile Ala Asn Glu His Glu Ile Val
 180 185 190

 ccc ctc att ctc gag tac aga aag atc cag aaa ctg aaa tcg acc tac 624
 Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr
 195 200 205

 ata gac acc ctt ccg aaa ctt gtg aac ccg aaa acc gga aga att cat 672
 Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His
 210 215 220

gca tct ttc cac cag acg ggt acc gcc act ggc agg ttg agt agc agt Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser 225 230 235 240	720
gat cca aat ctt cag aat ctt ccg aca aag agc gaa gag gga aaa gaa Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu 245 250 255	768
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gat gag aac ctt gtg aag gcc ttc gag gag ggc atc gat gtg cac acc Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr 290 295 300	912
ttg act gcc tcc agg atc tac aac gta aag cca gaa gaa gtg aac gaa Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu 305 310 315 320	960
gaa atg cga cgg gtt gga aag atg gtg aac ttc tct ata ata tac ggt Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly 325 330 335	1008
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gca gaa aag atg att atc agc tat ttc aca ctg tat cca aag gtg cga Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg 355 360 365	1104
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agg act ctc ttt gga aga aaa aga gat att ccc cag ctc atg gca agg Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg 385 390 395 400	1200
gac aag aac acc cag tcc gaa ggc gaa aga atc gca ata aac acc ccc Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro 405 410 415	1248
att cag gga acg gcg gca gat ata ata aaa ttg gct atg ata gat ata Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile 420 425 430	1296
gac gag gag ctg aga aaa aga aac atg aaa tcc aga atg atc att cag Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln 435 440 445	1344
gtt cat gac gaa ctg gtc ttc gag gtt ccc gat gag gaa aaa gaa gaa Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu 450 455 460	1392

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Leu Phe Gly Phe Ser Phe Ala Asp Val Pro Val Asp Lys Ala Ala Asn	
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Tyr Ser Cys Glu Asp Ala Asp Ile Thr Tyr Arg Leu Tyr Lys Ile Leu	
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Ser Met Lys Leu His Glu Ala Glu Leu Glu Asn Val Phe Tyr Arg Ile	
85 90 95	
Glu Met Pro Leu Val Asn Val Leu Ala Arg Met Glu Leu Asn Gly Val	
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Tyr Val Asp Thr Glu Phe Leu Lys Lys Leu Ser Glu Glu Tyr Gly Lys	
115 120 125	
Lys Leu Glu Glu Leu Ala Glu Lys Ile Tyr Gln Ile Ala Gly Glu Pro	
130 135 140	
Phe Asn Ile Asn Ser Pro Lys Gln Val Ser Lys Ile Leu Phe Glu Lys	
145 150 155 160	

Leu Gly Ile Lys Pro Arg Gly Lys Thr Thr Lys Thr Gly Ala Tyr Ser
165 170 175

Thr Arg Ile Glu Val Leu Glu Glu Ile Ala Asn Glu His Glu Ile Val
180 185 190

Pro Leu Ile Leu Glu Tyr Arg Lys Ile Gln Lys Leu Lys Ser Thr Tyr
195 200 205

Ile Asp Thr Leu Pro Lys Leu Val Asn Pro Lys Thr Gly Arg Ile His
210 215 220

Ala Ser Phe His Gln Thr Gly Thr Ala Thr Gly Arg Leu Ser Ser Ser
225 230 235 240

Asp Pro Asn Leu Gln Asn Leu Pro Thr Lys Ser Glu Glu Gly Lys Glu
245 250 255

Ile Arg Lys Ala Ile Val Pro Gln Asp Pro Asp Trp Trp Ile Val Ser
260 265 270

Ala Asp Tyr Ser Gln Ile Glu Leu Arg Ile Leu Ala His Leu Ser Gly
275 280 285

Asp Glu Asn Leu Val Lys Ala Phe Glu Glu Gly Ile Asp Val His Thr
290 295 300

Leu Thr Ala Ser Arg Ile Tyr Asn Val Lys Pro Glu Glu Val Asn Glu
305 310 315 320

Glu Met Arg Arg Val Gly Lys Met Val Asn Phe Ser Ile Ile Tyr Gly
325 330 335

Val Thr Pro Tyr Gly Leu Ser Val Arg Leu Gly Ile Pro Val Lys Glu
340 345 350

Ala Glu Lys Met Ile Ile Ser Tyr Phe Thr Leu Tyr Pro Lys Val Arg
355 360 365

Ser Tyr Ile Gln Gln Val Val Ala Glu Ala Lys Glu Lys Gly Tyr Val
370 375 380

Arg Thr Leu Phe Gly Arg Lys Arg Asp Ile Pro Gln Leu Met Ala Arg
385 390 395 400

Asp Lys Asn Thr Gln Ser Glu Gly Glu Arg Ile Ala Ile Asn Thr Pro
405 410 415

Ile Gln Gly Thr Ala Ala Asp Ile Ile Lys Leu Ala Met Ile Asp Ile
420 425 430

Asp Glu Glu Leu Arg Lys Arg Asn Met Lys Ser Arg Met Ile Ile Gln
435 440 445

Val His Asp Glu Leu Val Phe Glu Val Pro Asp Glu Glu Lys Glu Glu
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